SSC-5x86H Ver.C
Super 5x86H Half-sized
Single Board Computer

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Introduction

Welcome to the SSC-5x86H Super 5x86 Half-sized Single Board Computer. The SSC-5x86H board is an ISA and PC/104 form factor board, which comes equipped with high performance 486DX/DX2/DX4 or the latest Cyrix/AMD 5x86 CPU and advanced high performance multi-mode I/O, designed for the system manufacturers, integrators, or VARs that want to provide all the performance, reliability, and quality at a reasonable price.

An advanced high performance super AT I/O chip UMC UM8669 is used in the SSC-5x86H board. Both on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT and XT architecture's. The UM8669 incorporates sophisticated power control circuitry(PCC). The PCC supports multiple low power down modes.

In addition, the SSC-5x86H provides two 72-pin SIMM sockets for its on-board DRAM. The 72-pin accepts 1MB, 2MB, 4MB, 8MB, 16MB, and 32MB SIMM. So, the total on-board memory can be configured from 1MB to 64MB.

SSC-5x86H uses the ALI chipset, M1489 and M1487, which are 100% ISA compatible chipset.

The new Ver.C board have built-in DiskOnChip Flash Disk Function and ESD +/-15KV protection RS-232 ports. The new version will only need +5V power supply. It will be more suitable for embedded application.

1.1 Specifications :

The SSC-5x86H Super 5x86 Half-sized Single Board Computer provides the following specification:

- **CPU** : 486SX/DX/DX2/ DX4 or Cyrix/AMD 5x86

- **Bus** : ISA bus and PC/104 bus

- **DMA channels** : 7

- **Interrupt levels** : 15

- **Chipset** : M1489 and M1487

- **Real-time clock/calendar** : DS-12887 chip and quartz oscillator, 128B CMOS memory, powered by lithium battery for over 10 years of data retention.

- **RAM memory** : 1MB to 64MB,EDO and standard DRAM supported

- **E-IDE hard disk drive interface** : up to two PCI Enhance IDE hard drives.

- **Floppy disk drive interface** : two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives.

- **Two high speed Series ports** : NS16C550 compatible UARTs

- **Bi-directional Parallel Port**

- **Watch-dog timer** : can be set by 1,2,10,20,110 or 220 seconds period. Reset or NMI was generated when CPU did not periodically trigger the timer. Your program use hex 043 and 443 to control the watch-dog and generate a system reset.

- **External power connector**

- **Keyboard connector**

- **Mouse** : PS/2 Mouse Port on-board.

- **Power Consumption** : +5V @ 1.75A (5x86-133, 4MB RAM)

- **Operating Temperature** : 0° ~ 60° C (CPU needs Cooler)

1.2   What You Have

In addition to this *User's Manual*, the SSC-5x86H Ver.C package includes the following items:

- SSC-5x86H Ver.C Super 5x86 Half-sized SBC

- Printer Cable

- FDD/HDD Cable

- 6-pin Mini-Din to 5-pin Din Keyboard Adapter Cable

If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.

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Installation

This chapter describes how to install the SSC-5x86H. At first, the layout of SSC-5x86H is shown, and the unpacking information that you should be careful is described. The jumpers and switches setting for the SSC-5x86H's configuration, such as CPU type selection, system clock setting, and interrupt IRQ setting for serial ports and parallel port, are also included.

2.1   SSC-5x86H Ver.C Layout

< reference next page >

2.2 Jumper Description

You can change the SSC-5x86H's configuration by setting jumper switches on the board. The board's jumpers are preset at the factory. Under normal circumstances, you should not need to change the jumper settings.

A jumper switch is **closed** (sometimes referred to as shorted with the plastic cap inserted over two pins of the jumper). A jumper is **open** with the plastic cap inserted over one or no pin(s) of the jumper. Figure 2.2 below shows different jumper settings which will be used in this chapter.
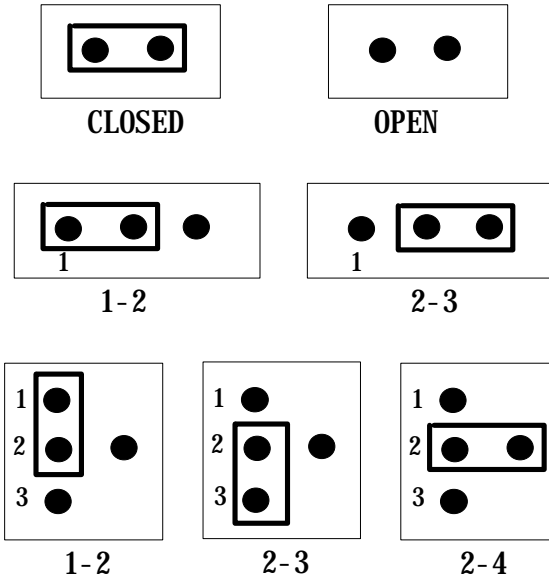
Figure 2.2

2.3 CPU setting of SSC-5x86H Ver.C

If you want to upgrade the CPU, you must do two things:
1. Set the jumpers for CPU type.
2. Adjust the jumpers setting for CPU speed.

• **CPU Type Setting:**

CPU Type	JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8	JP9
Intel DX4 &E	2-3	2-3	3-4	3-4	3-4	OFF	OFF	1-2	ON
* Cyrix 5x86 AMD DX4+ (SV8B) Intel DX2/DX4 &EW SGS ST486DX4V ST486DX2V	**2-3**	**2-3**	**3-4**	**3-4**	**3-4**	**5-6**	**2-3**	**2-3**	**ON**
Cyrix/TI/SGS DX2/DX4	2-3	2-3	5-6	5-6	5-6	1-2	1-2	1-2	ON
AMD DX2/DX4 (NV8T)	2-3	2-3	OFF	OFF	1-2	OFF	OFF	1-2	OFF
AMD DX2+(SV8B) AM5x86 P75 (133Mhz)	2-3	2-3	3-4	3-4	3-4	1-3 5-6	2-3	2-3	ON

(*) : default setting

ON=CLOSE   OFF=OPEN   JP10 : OPEN

• **CPU Clock Setting :**

CPU Clock	JP12	JP14	JP11 1-2	JP11 3-4
25MHz	OPEN	1-2	OPEN	OPEN
* 33MHz	**OPEN**	**1-2**	**CLOSE**	**CLOSE**
40MHz	CLOSE	2-3	OPEN	CLOSE

(*): default setting

> **Note :**
> **DX2-66/DX4-100/5x86-100 sets CPU Clock - 33Mhz**
> **AMD 5x86 P75(133MHz) sets CPU Clock - 33MHz**
> **DX2-80/DX4-120/5x86-120 sets CPU Clock - 40MHz**

• **CPU Voltage Selection - 3.3V, or 3.45V**

Because right now in the market have several kind of CPUs using different voltage in core logic. For example the AMD offers 486DX2-66/80 and DX4-100/120 at 3.3V,Intel offers DX4-75/100 at 3.3V,and some Cyrix CPU will use 3.45V.

CPU Voltage	JP13
* +3.3V	2-3
+3.45V	1-2

(*) : default setting

2.4 Watch-Dog Timer

The Watch-Dog Timer is enabled by reading port 443H. It should be triggered before the time-out period ends, otherwise it will assume the program operation is abnormal and will issue a reset signal to start again, or activate NMI to CPU. The Watch-Dog Timer is disable by reading port 043H. See Appendix A for more detailed description of Watch-Dog Timer.

- **JP15 : Watch-Dog Active Type Setting**

JP15	DESCRIPTION
*1-2	**RESET WHEN WDT TIME-OUT**
2-3	ACTIVATE NMI TO CPU WHEN WDT TIME-OUT
OPEN	DISABLE WDT

(*): default setting

- **JP16: WDT Time-Out Period**

PERIOD	1-2	3-4	5-6	7-8
1 sec.	OPEN	OPEN	CLOSE	OPEN
2 sec.	OPEN	OPEN	CLOSE	CLOSE
*10 sec.	**OPEN**	**CLOSE**	**OPEN**	**OPEN**
20 sec.	OPEN	CLOSE	OPEN	CLOSE
110 sec.	CLOSE	OPEN	OPEN	OPEN
220 sec.	CLOSE	OPEN	OPEN	CLOSE

(*) : default setting

2.5 DiskOnChip™ Flash Disk

The DiskOnChip Flash Disk Chip(DOC) is produced by
M-Systems. The DOC have two models in market ED1102
(28-pin) and ED1202(32-pin). The two models DOC can be
used in SSC-5x86H Ver.C board. Because the DOC is 100%
compatible to hard disk and DOS. Customer don't need any extra
software utility to use it. It is just "plug and play",easy
and reliable. Right now the DOC is available in 1MB/2MB
capacity, in the near future will have 4/8/16MB model soon.

• JP17 : DiskOnChip Memory Address Setting

JP17	Address
1-2	D000
3-4	D800
* 5-6	E000

(*): default setting

WARNING !!
If you install the ED1102,28-pin type, the ED1102 pin-1
should be at the 32-pin socket's pin 3.
Wrong installation will damage the ED1102 DOC.

2.6 PS/2 Mouse Setting

The PS/2 mouse will use the IRQ12 when operation.
The JP18 is using to control the PS/2 mouse enable/disable.

• JP18 : Enable/Disable PS/2 Mouse

JP18	Description
OPEN	Disable PS/2 Mosue
* CLOSE	Enable PS/2 Mouse,IRQ12

(*): default setting

3

Connection

This chapter describes how to connect peripherals, switches and indicators to the SSC-5x86H board.

3.1 Floppy Disk Drive Connector

SSC-5x86H board comes equipped with a 34-pin daisy-chain driver connector cable.

• **CN6 : FDC CONNECTOR**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	REDUCE WRITE
3	GROUND	4	N/C
5	GROUND	6	N/C
7	GROUND	8	INDEX#
9	GROUND	10	MOTOR ENABLE A#
11	GROUND	12	DRIVE SELECT B#
13	GROUND	14	DRIVE SELECT A#
15	GROUND	16	MOTOR ENABLE B#
17	GROUND	18	DIRECTION#
19	GROUND	20	STEP#
21	GROUND	22	WRITE DATA#
23	GROUND	24	WRITE GATE#
25	GROUND	26	TRACK 0#
27	GROUND	28	WRITE PROTECT#
29	GROUND	30	READ DATA#
31	GROUND	32	SIDE 1 SELECT#
33	GROUND	34	DISK CHANGE#

3.2 PCI E-IDE Disk Drive Connector

You can attach two IDE(Integrated Device Electronics) hard disk drives to the SSC-5x86H internal controller.

• **CN1: IDE Interface Connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	N/C	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	N/C	28	BALE - DEFAULT
29	N/C	30	GROUND - DEFAULT
31	INTERRUPT	32	IOCS16#-DEFAULT
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND

3.3 Parallel Port

This port is usually connected to a printer, The SSC-5x86H includes an on-board parallel port, accessed through a 26-pin flat-cable connector CN9.

• **CN9 : Parallel Port Connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	2	DATA 0
3	DATA 1	4	DATA 2
5	DATA 3	6	DATA 4
7	DATA 5	8	DATA 6
9	DATA 7	10	ACKNOWLEDGE
11	BUSY	12	PAPER EMPTY
13	PRINTER SELECT	14	AUTO FORM FEED #
15	ERROR#	16	INITIALIZE

17	PRINTER SELECT LN#	18	GROUND
19	GROUND	20	GROUND
21	GROUND	22	GROUND
23	IOW#	24	GROUND
25	GROUND		

3.4 Serial Ports

The SSC-5x86H offers two high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports.

- **CN12 & CN14 : Serial Port DB-9 Connector(ACE0 & ACE1)**

PIN NO.	DESCRIPTION
1	DATA CARRIER DETECT (DCD)
2	RECEIVE DATA (RXD)
3	TRANSMIT DATA (TXD)
4	DATA TERMINAL READY (DTR)
5	GROUND (GND)
6	DATA SET READY (DSR)
7	REQUEST TO SEND (RTS)
8	CLEAR TO SEND (CTS)
9	RING INDICATOR (RI)

3.5 Keyboard Connector

The SSC-5x86H provides two keyboard connectors.

- **CN10 : 5-pin Header Keyboard Connector**

PIN NO.	DESCRIPTION
1	KEYBOARD CLOCK
2	KEYBOARD DATA
3	N/C
4	GROUND
5	+5V

- **CN15 : 6-pin Mini-DIN Keyboard Connector**

PIN NO.	DESCRIPTION
1	KEYBOARD DATA
2	N/C
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	N/C

3.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board.

- **CN4 : RESET BUTTON**

PIN NO.	DESCRIPTION
1	EXTERNAL RESET
2	GROUND

- **CN2 : POWER LED & KEYLOCK**

PIN NO.	DESCRIPTION
1	POWER LED ANODE
2	KEY
3	GROUND
4	KEYLOCK
5	GROUND

- **CN5 : IDE LED connector**

PIN-NO	DESCRIPTION
1	+5V
2	HDD ACTIVE#

3.7 External Power Connector

The SSC-5x86H has an on-board external power connector CN11. You can connect power directly to the CPU board for some single-board-computer(without passive backplane) application.

- **CN11 : EXTERNAL POWER CONNECTOR**

PIN NO.	DESCRIPTION
1	+5V
2	+12V
3	-12V
4	GROUND

5	GROUND
6	-5V
7	+12V
8	+5V

3.8 External Speaker

The SSC-5x86H has its own buzzer, you also can connect to the external speaker through the connector CN3.

- **CN3 : Speaker Connector**

PIN NO.	DESCRIPTION
1	SPEAKER SIGNAL
2	NC
3	GROUND
4	+5V

3.9 PS/2 Mouse 6-pin Mini-DIN Connector

- **CN13 : PS/2 Mouse Connector**

PIN NO.	DESCRIPTION
1	MS DATA
2	NC
3	GROUND
4	+5V
5	KBT1
6	NC

3.10 PC/104 Connection Bus

The SSC-5x86H's PC/104 expansion bus let you attach any kind of PC/104 modules. The PC/104 bus is already become the industrial standard, so you could easily install over thousands of PC/104 modules from hundreds of venders in the world.

> **Note :**
> **The PC/104 connector allows stack-thru PC/104**
> **Module directly to plug in.**
> **Don't need any additional mounting Kit.**

- **CN7 & CN8 : PC/104 Expansion Bus**

(**CN7 = 64-pin female connector;**
CN8 = 40-pin female connector.)

Pin NO.	J1 / P1 Row A	J1 / P1 Row B	J2 / P2 Row C	J2 / P2 Row D
0	--	--	0V	0V
1	IOCHECK*		SBHE*	MEMSC16*
		0V		
2	SD7	RESETDRV	LA23	IOSC16*
3	SD6	+5V	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	-5V	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	-12V	LA18	IRQ14
8	SD1	NOWS*	LA17	DACK0*
9	SD0	+12V	MEMR*	DRQ0
10	IOCHRDY	(KEY)	MEMW*	DACK5*
11	AEN	SMEMW*	SD8	DRQ5
12	AS19	SMEMR*	SD9	DACK6*
13	SA18	IOW*	SD10	DRQ6
14	SA17	IOR*	SD11	DACK7*
15	SA16	DACK3*	SD12	DRQ7
16	SA15	DRQ3	SD13	+5V
17	SA14	DACK1*	SD14	MASTER*
18	SA13	DRQ1	SD15	0V
19	SA12	REFRESH*	(KEY)	0V
20	SA11	SYSCLK	--	--
21	AS10	IRQ7	--	--
22	SA9	IRQ6	--	--
23	SA8	IRQ5	--	--
24	SA7	IRQ4	--	--
25	SA6	IRQ3	--	--
26	SA5	DACK2*	--	--
27	SA4	TC	--	--
28	SA3	BALE	--	--
29	SA2	+5V	--	--
30	SA1	OSC	--	--
31	SA0	0V	--	--
32	0V	0V	--	--

NOTES:
1. Rows C and D are not used on 8-bit modules.
2. P2 has two connector options with differing physical pinout orientation.
3. B10 and C19 are key locations.
4. Signal timing and function are as specified in p996.
5. Signal source/sink current differ from P996 values.

4

AWARD BIOS Setup

The SSC-5x86H uses the AWARD PCI/ISA BIOS for system configuration. The AWARD BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options which may be selected for end-user requirements. This chapter is written to assist you in the proper usage of these features.

4.1 Getting Start

When powered on the system, the BIOS will enter the Power-On-Self-Test routines. These routines will be executed for System Test and Initialization and System Configuration Verification. After the POST routines are completed, the following message appears :

" Press DEL to enter setup"

To access AWARD PCI/ISA BIOS Setup program, press <Del> key. The following screen will be displayed at this time.

4.2 Standard CMOS Setup

The Standard CMOS Setup is used for basic system hardware configuration. Every time when you change any hardware configuration,for example memory size,you have to modify this setup again. Please refer the following screen for this setup.

Mode Setting for >528MB IDE HDD

When the IDE hard disk drive you are using is larger than 528MB,please set the HDD mode to **LBA** mode.

Note : Setting incorrect drive mode may make the drive working improperly.

4.3 BIOS Features Setup

This setup is designed for customer's tuning best performance of the SSC-5x86H board. As for normal operation customers don't have to change any default setting.The default setting is pre-setted for most reliable operation.

Virus Waring :
   Enable - Will halt system when any attempt to
          write to boot sector or patition table of hard disk.
Memory Parity Check :
   Disable - Will not check the DRAM module's parity. Right now
  almost 72-pin SIMM DRAM did not have parity function.
Video BIOS Shadow :
   Enable - Will increase the video speed.
C8000-CFFFF,D0000-D7FFF,& D8000-DFFFF Shadow :
    When the installed add-on card's ROM address is as

above address,you could enable the shadow to get higher operation performance.When you enable the shadow function,it will also reduce the memory available by between 640KB and 1024KB.

4.4 Chipset Features Setup

This setup functions are almostly working for ChipSet(ALI M1489 and M1487). These options are used to change the ChipSet's registers. Please carefully change any default setting ,otherwise the system could be running un-stable.

Auto Configuration :

  Enable : The BIOS will configure the ChipSet features
            automatically when boot up the system.
  Disable : The BIOS will allow customer to change the setting

on the screen.

Parallel Port Mode : SPP(default),EPP,ECP,ECP+EPP

Onboard FDC Controller : Enabled(default),Disabled

Onboard Serial Port 1 :
COM1/3F8(default),COM2/2F8,COM3/3E8,COM4/2E8
Disabled
Onboard Serial Port 2 :
COM2/2F8(default),COM3/3F8,COM4/2E8,Diabled
COM1/3F8
Onboard Parallel Port :
378H/IRQ7(default),278H/IRQ5,3BCH/IRQ7,Disabled

4.5 Power Management Setup

Power Management Setup help user handles the SSC-5x86H
board's "green" function. The features will shut down the video
display and hard disk to save energy.

Power Management :

This is the master control of all power management functions.
The default setting is "disable" for general application.

  User Defined : Allows user to set any power saving options.
  Min. Saving : System enters power saving mode after
                    1 hour no activity.
  Max. Saving : System enters power saving mode after
                    5 seconds no activity.

PM Control by APM :

No - Default setting
Yes - System BIOS will wait for APM prompt before it enters
     any power management mode.

Note : APM Mode :
    This mode is using for DOS 6.0 or higher version with
    the driver POWER.EXE. The driver should be loaded
    at system power-on by CONFIG.SYS file. POWER.EXE
    will monitor the system status thru the BIOS APM
    interface.

Video Off Option :

Susp,Stby ¡ Off - Screen Off when system in Suspend or
                  Standby mode.
Susp ¡ Off - Screen Off when system in Suspend mode.
All Modes ¡ Off - Screen Off when system in Suspend,
                Standby,or Doze mode.
Alway On - System BIOS will never turn off the screen.

Video Off Method :

Blank Screen : When BIOS do the video off the screen
              will be blank.
V/H Sync, + Blank : When BIOS do the video off,BIOS will turn
                 of the V-sync & H-sync signals from VGA

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card and also let the screen blank.

PM Timers :

User can set the HDD Power Down,Doze Mode,Standby Mode, and Suspend Mode's time out period. The system will be recovered when the system is re-activity.

PM Events :

If there is any activity occured on the list of the group,the system will wake up. You can set the IRQ1,IRQ3-15 individually in the list.

Appendix A. Watch-Dog Timer

The Watch-Dog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that caused the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, hardware on the board will either perform a hardware reset (cold boot) or a non-maskable interrupt (NMI) to bring the system back to a known state.

The Watch-Dog Timer is controlled by two I/O ports.

443 (hex)	Read	Enable the refresh the Watch-Dog Timer.
043 (hex)	Read	Disable the Watch-Dog Timer.

To enable the Watch-Dog Timer, a read from I/O port 443H must be performed. This will enable and activate the countdown timer which will eventually time out and either reset the CPU or cause an NMI depending on the setting of JP15. To ensure that this reset condition does not occur, the Watch-Dog Timer must be periodically refreshed by reading the same I/O port 433H. This must be done within the time out period that is selected by jumper group JP16.

A tolerance of at least 30% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time consuming. Therefore if the time out period has

been set to 10 seconds, the I/O port 443H must be read within 7 seconds.

Note: when exiting a program it is necessary to disable the Watch-Dog Timer, otherwise the system will reset.

```
10      REM EXAMPLE PROGRAM
11      REM WATCH-DOG TIMER == WDT
20      GOSUB 5000 REM ENABLE AND REFRESH THE WDT
30      GOSUB 1000 REM TASK 1, 2 SECS
40      GOSUB 5000 REFRESH THE WDT
50      GOSUB 2000 REM TASK 2, 3 SECS
60      GOSUB 6000 REM DISABLE THE WDT
70      GOSUB 3000 REM TASK 3, 5 SECS
80      GOSUB 5000 REM ENABLE AND REFRESH THE WDT
90      GOTO 30

1000    REM SUBROUTINE #1
        2 SECONDS TO COMPLETE
1070    RETURN

2000    REM SUBROUTINE #2
        3 SECONDS TO COMPLETE
2070    RETURN

5000    REM SUBROUTINE TO ENABLE AND RESET  WDT
5010    X = INP( &H443) REM ENABLE AND REFRESH TIMER
5020    RETURN

6000    REM SUBROUTINE TO DISABLE THE WDT
6010    X = INP( &H43)  REM RESET WDT
6020    RETURN
```